China – from Consumer Goods Manufacturer to Innovation Leader?

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Declaration

This Bachelor Project is submitted as part of the final examination requirements of the Geneva School of Business Administration, for obtaining the Bachelor of Science HES-SO in Business Administration, with major in International Management.

The student accepts the terms of the confidentiality agreement if one has been signed. The use of any conclusions or recommendations made in the Bachelor Project, with no prejudice to their value, engages neither the responsibility of the author, nor the adviser to the Bachelor Project, nor the jury members nor the HEG.

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Executive Summary

In this study, we will first explore the definition of innovation and reverse innovation. Innovation is on every lip now and it is important to explore and define clearly their exact meaning for this study. Reverse innovation is one of the most important concepts in a study about China. As Roger L. Martin, dean of the Rotman School of Management, University of Toronto said, “Water may not flow uphill but innovation does!” and it is something we have to examine since it might be the key for the Western countries’ companies to stay competitive against the Chinese ones.

This study will then examine the current state of innovation in the Western countries and in China to dress a rapid image of where innovation stands now and whether it is shifting from Western countries to China.

We will also dress an overview of the current economic situation in China, the world’s second largest economy rising strongly for many years. China is having a worrying indebtedness situation caused by a huge investment in construction to counter the decline of GDP caused by the 2008 crisis in the Western countries. We will see how China wants to solve that by investing in innovation, helped by many factors such as the good market opportunities, the strong capital availability and a wish from the government to change its economy from production and investment driven economy to an innovation driven economy by promoting technological innovation.

Finally, with the example of the smartphone industry, we will analyze in what extent China effectively raised its investment in innovation and how its smartphone production and exports are booming. We will conclude by dressing two possible scenarios for its future that could be a crisis such as the one the Western countries knew in 2008, or to become the world’s innovation leader.

Key words: Innovation, smartphones, economy, China.

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Introduction

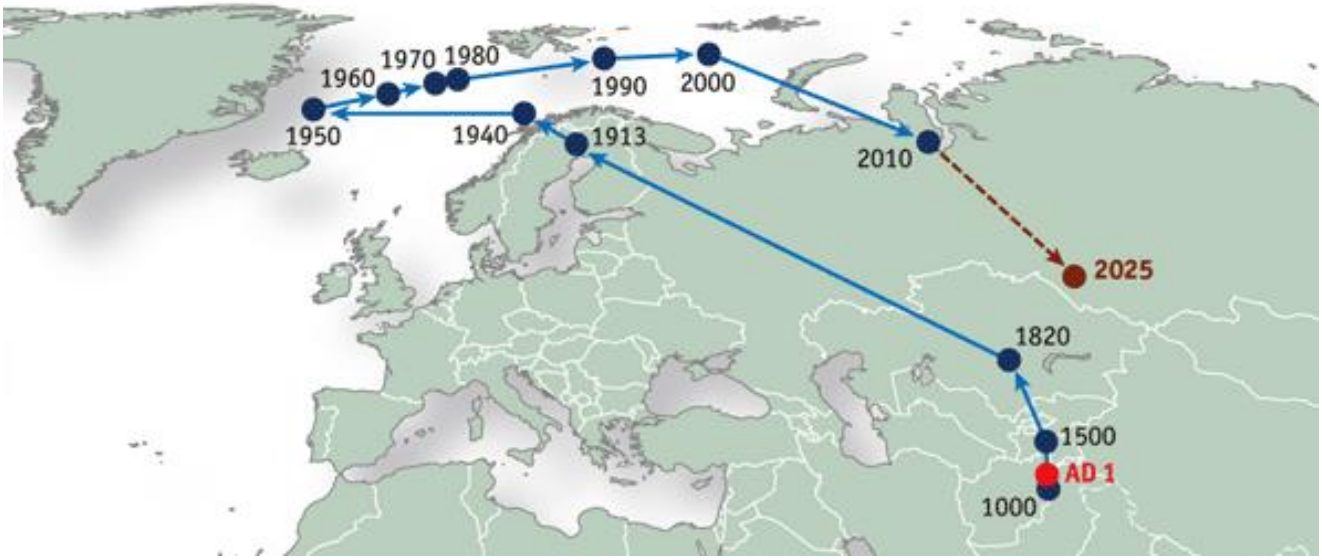
Already in 1939, Schumpeter, a renowned researcher in the innovation and entrepreneurship field, stated that China's greatest challenge of the last century was to rekindle its innovative “spirit”.

As written in a MIT Technology Review[1], the factors driving growth to a country with a $500 GDP per capita are totally different from the ones when it reaches the $5000 mark or above. This is very important concerning China, a country experiencing a high growth for many years, from a $469 per capita in 1994 to a $6,091 in 2012[2]. When you have a $500 GDP per capita you can copy the technology and production methods of other countries but when you have a higher GDP per capita you need political reforms and innovation. As Ajay Banga, the President and CEO of Master Card said: “As the world’s economic center of gravity continues to shift – and as new consumers continue to emerge – it’s clear that the logic and business practices that drove yesterday’s success won’t drive tomorrow’s” (cited in Govindarajan, 2012).

Innovation is a mainstream topic that attracts the interest of many people and generates animated debates. Another mainstream topic is the rise of China and its consequences. This is why we think that this study can reach a broad public of people who wonder what innovation is, what is going on in China and where China is situated in this innovation battle. Is there a shift of innovation going on? Will China change from being a consumer goods manufacturer to an innovation leader, moving the economic center of gravity back to Asia?

[1] MIT Technology Review. http://www.technologyreview.com/view/507431/chinas-innovation-success-depends-on-political-changes/
[2] Wold Bank GDP per capita. http://data.worldbank.org/indicator/NY.GDP.PCAP.CD

Figure 1 - Evolution of the Earth's Economic Center of Gravity AD 1 to 2025



Source: McKinsey Global Institute (2012)

Somehow, ironically, three major inventions, the magnetic compass, gunpowder and the printing press, which helped to establish Western world's hegemony are coming from China (Needham, 1982). As we can see in the picture above, this could therefore not be the first time that the economic center of gravity would travel between East and Western countries. The shift from East to West driven in the past by the industrial revolution could be reverted by a back-shift driven by innovation.

In this study, we decided to focus on a booming market to demonstrate China's investment in innovation and its possible success: the smartphone market. Our lives are transformed by smartphones and, as we will point out, China is becoming a more and more important actor in this market.

This study will allow the readers to fully understand the actual Chinese situation and the scenarios that we could experience in the future, depending of the capacity of China to turn its growth to an innovation driven economy. After reading this work, the readers will be well prepared to analyze and understand what could change the world as we know it today.

Objectives

In order to examine the different topics mentioned in the introduction, this study will have 4 objectives:

1. Explore the definition of innovation and reverse innovation to have a clear view on the subject and understand these concepts.
2. Examine the current state of innovation in China and in the Western countries and the direction it is taking.
3. Analyze China's current economic situation and its implications for innovation
4. Explore if there is a growth in smartphones production and exports and in China's innovation indicators.

For the first objective, we will explore the literature concerning innovation and reverse innovation. Concerning the second objective, we will conduct an analysis of the news feeds concerning innovation in China and in the Western countries. For the third objective, we will explore the literature about China's current economic situation in relation with recent events appearing in the news. Finally, the fourth objective will consist in an analysis of data from the International Trade Center and the World Bank.

Literature Review

What is Innovation?

Innovation is a term that is frequently used by many but that can have different significance depending on the person and on the field where it is used. Innovation exist for a very long time. For example, Howard Ruff, author of numerous financial planning books, has been quoted as saying, "It was not raining when Noah built the ark."[3.] Noah was therefore already an innovator; he found a new solution meeting new, yet inexistent requirements. However, in this study, we will focus more specifically on the definition of innovation in relation with the entrepreneurial field.

For the economist Joseph Schumpeter (1949), a great contributor of the innovation literature, innovation brings something new and is generally considered as a process bringing together various new ideas in a way that they have an impact on society, engendering a competitive advantage for a company.

One of the first definitions of innovation is found in Schumpeter's forces of creative destruction (Schumpeter, 1934). It mentions the introduction of a good or a significant improvement in the quality of an existing good, the introduction of a new method of production, the opening of a new market, the conquest of a new source of supply of raw materials or half-manufactured good and the creation of a new type of industrial organization.

Shumpeter (1939) mentioned later the fact that innovation is a pivotal driving force that can devastate some firms but also rewards others. It is also a force that leads to surges in economic growth. This is another argument showing how important it is for China to concentrate on innovation to sustain its growth. This force was called "creative destruction" (Shumpeter, 1939).

In an article written by John Hagedoorn (1996), we can find interesting outputs about Schumpeter's theories dating from the forties. We can read that Shumpeter thinks that big companies are a driver for innovation and that the entrepreneur is its personification. For him, innovation and entrepreneurship are clearly correlated. The entrepreneur in a

[3] Reference year not found

company is analyzed in terms of the function in a company and not necessarily as a physical person.

In the article, we learn that there are three aspects for understanding innovation, the technical, marketing and organizational aspects and they should be considered separately. In this work, we will focus more on the organizational aspect since we are aiming to see how governmental decisions can influence innovation at a country and even worldwide level.

Hagedoorn (1996) also emphasizes that a central point in Schumpeter's theory is how innovation is understood as a major desequilibrating force, the one called "creative destruction" mentioned earlier. He explains that the introduction of new products and processes creates this imbalance and plays an important role in reshaping the competition in a domestic and international market with a short- and long-term effect on consumers, companies and nations through the creation and redistribution of economic welfare in a gradually expanding economic space. While developing this study, we should constantly keep this devastating or desequilibrating aspect in mind. Could China's decisions and actions on innovation, as a desequilibrating force, change the world as we know it?

Another interesting definition of innovation is the one given by Peter Drucker (2002), an economist who wrote his first book in 1939 and was influenced by Schumpeter's works[4]. For him innovation is the specific function of entrepreneurship. Innovation is therefore the entrepreneur's instrument that creates new wealth-producing resources or endows existing resources with enhanced potential for creating wealth.

The definition of innovation can also be linked with companies. One way to describe innovation in the entrepreneurial field that we will consider in this study is the way Weber (2005) defined innovative companies. For him, an innovative company distinguishes itself by the fact that it searches and finds gaps, always looking for things to change or new things to do, fostering ideas that no one else has, does not give up too early, being ready to accept risks, sticking to ideas even against big resistance and taking chances that are futile to others.

[4] The economist. http://www.economist.com/node/14903040

In the organizational context, innovation can be linked to positive changes in efficiency, quality, market share, productivity or competitiveness. Recent research findings highlight the importance of organizational culture to allow organizations to transform innovative activity into performance improvements (Salge & Vera, 2012). There is therefore a difference between inventing something new and innovation which implies a better usage of something that exists. However, innovation goes beyond improvement, by doing something differently, not doing the same thing in a better way. Theodore Levitt (cited in Kriz, 2010) gave another interesting definition of innovation by differentiating it from creativity. He suggested that “creativity is thinking up new things. Innovation is doing new things”

There are actually few consensuses among researchers regarding innovative and entrepreneurial definitions in general (Brem, 2011). However, as Brem says in his introduction, innovation and entrepreneurship are arguably the main triggers for the long-term success of a company. Porter and Stern (2001) demonstrated that the success of a company’s competitiveness depends strongly of its innovativeness and that innovation is an important factor for economic progress but even more, it is an essential element in the competition of companies and nation in general (Beaver and Prince, 2002).

Innovation is usually associated with technology according to Georges Haour (2010) but it may not involve technical advance as we saw with the Sony Walkman that relied only on a brilliant innovative concept which was to make an existing device transportable and thus expanding its usage possibilities. In business, innovation is something new to a particular market, for example fiber-reinforced plastics for automobiles but that has been used for many years in the airplane industry. Innovation can therefore be a small improvement to an existing idea or a radical development.

Innovation and Entrepreneurship

Since this study will focus on the shift of innovation from the Western countries to China specifically for the smartphone industry, it is important to examine the literature about the link between innovation and entrepreneurship.

Joseph Schumpeter (1934) stated that all businesses, no matter how successful as a result of some initial innovation, must continue to innovate if they are to survive. As mentioned by Govindarajan (2012), Nokia, the world’s largest vendor of mobile phone,

failed to adapt to the continuous change and to resist using the “creative destruction” thought by Schumpeter (1939) to its profit. Nokia did not notice the abrupt change of phones into touchscreen devices that Samsung immediately adapted. Nokia now has only 3% market share in smartphones (Haour, 2010). Failing to make their products more innovative pushed Nokia to shrink to the bottom of the chain.

Now what is an innovative firm? According to Haour (2010), it has several ingredients. First, the senior leaders must show their staff that they are champions of innovation. Then, the company must have an “innovative climate”, which means that all the managers and the board appreciate and understand the complexity of the innovation process and its risks. To catalyze these two factors, the management development is vital, it accelerates and guides firms on the path of becoming more innovative and requires the company to become more open to external input and to be ready to learn from work with customers, suppliers and other partners.

Haour (2010) says that there are two main trends that will shape innovation process in the months and years to come. First, the companies must deal with more and more external inputs like universities, SMEs or startup that can complement their own internal capabilities and this can be made using information technology, putting in contact problem-solvers worldwide. Second and most importantly in this work, Haour says that India and China are becoming real sources of innovation in business practices and models. The Western companies must therefore make the effort to learn from what is happening in these countries, not only in terms of technical developments but also for new business models and approaches. Apple iTunes was a success not because of its technical development but because of its excellent business model, together with the iPod.

A study of Wong & al. (2005) consisted to assess the effect of different types of entrepreneurial activities on economic growth. These were:

- The total entrepreneurial activity rates
- The high growth potential of the total entrepreneurial activities
- The necessity of the total entrepreneurial activities
- The opportunity of the total entrepreneurial activities
- The overall total entrepreneurial activities.

It was found that only the high growth potential entrepreneurship had a significant impact on economic growth which the authors say is consistent with other findings in the literature. This means that fast growing new firms have a real impact on the economic growth, where growing fast is far more important than being new. This is an essential point because this high growth potential of total entrepreneurial activities is described in the article as the sole form of entrepreneurship that has any explanatory effect on differing states of economic growth across nations. China has many very fast growing new firms; in fact it is even the country with the most ranked companies on the annual list of the top 500 fastest-growing companies in APAC as we can read on the website of the UK-based consulting firm Deloitte[5]. One of the most successful of these firms is Xiaomi Tech[6] which we focus on more in detail in the later chapter about the smartphone industry.

This study from Wong & Al. (2005) brings another argument for the use the smartphone market industry as a key industry to analyze, when measuring innovation and high growth. It also points out that innovation and entrepreneurship form a viable model of growth for China.

Reverse Innovation

Reverse innovation is a key notion that is crucial to understand since one of the key questions of this study is to check China's potential to become the world's innovation leader, leaving the Western companies behind if they do not react.

Reverse innovation is described simply by Vijay Govindarajan (2012) in the preface of his book, as the ability to innovate specifically for emerging markets. As the title of his book says, to win everywhere you must learn to create far from home.

Reverse innovation refers broadly to the process whereby goods developed as inexpensive models for low budget markets in developing nations. For example, battery-operated medical instruments in countries with limited infrastructure are then repackaged as low-cost innovative goods for Western buyers[7].

[5] Deloitte. http://www2.deloitte.com/global/en/pages/technology-media-and-telecommunications/articles/Technology-Fast-500-APAC-2013-Winners.html
[6] About Xiaomi Tech: http://www.mi.com/en/about
[7] References in this chapter are from Govindarajan's manuscript (2012)

Figure 2 - Reverse Innovation

Source: HCD Connect (2013)

As John Chambers, the Chairman and CEO of Cisco Systems, Inc. says “The global community is now so networked that innovation can come from just about anywhere and make an impact everywhere”

Indra Nooyi, the chairman and CEO of PepsiCO wrote in the foreword of Govindarajan’s manuscript that “A market wants to have its culture, values, and tastes reflected back in the products it chooses to consume.” The different people living in our word have some desires in common such as the fact that they want healthy products or products manufactured in a sustainable way. However, in the different countries, people have local needs and preferences and this is at the heart of reverse innovation which is easier to accept than to put it into practice, as Govindarajan says: “Reverse innovation begins not with inventing but with forgetting”.

Reverse innovation has been rare because most innovation naturally flows downhill, not uphill. People want the best and the latest and therefore this pushes technology forward.

If Western multinational companies chose to ignore reverse innovation, this might open the door for the emerging giants, the rising generation of multinationals headquartered in the developing world. There would be a shift of innovation from Western countries to the emerging ones and from classic innovation to reverse innovation. The giant multinationals

know their Western competitors and how to compete with them; the real menace is the emerging companies such as Mindray, Suzlon or Goldwin.

Big multinational companies are seeking explosive growth in emerging countries now and they must learn new tricks to succeed. Reverse innovation shows leaders and senior managers how such innovations can unlock opportunities throughout the world.

In Govindarajan's manuscript (2012), we learn that 85% of the world population lives in poor countries and that China is the number one in population and has the second highest GDP of the world. These facts point out the importance of reverse innovation, particularly in China. China is only 120th in the GDP per capita[8], and the needs of people in the Western countries are very different than the needs in China. This fact points out the importance of reverse innovation. To summarize this, Govindarajan qualifies China as a megamarket with microconsumers.

Global economy is very interconnected, therefore, reverse innovation can have a global impact and can migrate from poor countries to the rich ones. Here the concept of glocalisation needs to be approached and criticized. Glocalisation posts that the work of innovation has already occurred. However this is not the right approach for Govindarajan because what works in the rich world won't automatically achieve wide acceptance in emerging markets. Reversely, products conceived for emerging market can offer unexpected or long-overlooked value. Wall-mart for example changed its formula, offering smaller shops with smaller quantities when they expanded in Mexico, Brazil and Argentina and then successfully brought back this concept to the U.S..

Glocalisation is not to be confounded with reverse innovation. Both are useful, glocalisation aims to gain more market share by modifying its products for the emerging market. Reverse innovation is about creating products and create a market in emerging countries. Nokia focused too much on reverse innovation and companies like Apple and Google took advantage of it. Innovation in rich countries is still critical and some people in the emerging countries live with the same standards as in the rich ones. Moreover, glocalisation still accounts for the vast preponderance of global revenues today. Therefore, companies must learn to execute reverse innovation and glocalisation simultaneously.

[8] CIA World Factbook 2013: https://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html

Reverse innovation requires a clean-slate innovation answering to who are the targeted customers, what value to deliver them and what is the value chain architecture to use to deliver that value.

People in emerging countries do not want our old technologies sold cheaper; they want new ones thought for them. For example the people in China do not want black and white TVs.

One unjustified fear with reverse innovation is that the products would have a very low margin but it is entirely possible to earn the same or even better according to Govindarajan and even if the margin is smaller, fixed costs in emerging countries are often lower and volume potential much larger. There is also a fear of “cannibalization” or to put the brand at risk but it is often better than inaction.

Examples of reverse innovation can be found across various industries and geographies. For example, Microsoft is creating new phone app services for "dumb" phones which allow users with existing, non-smartphone devices to access Web sites such as Twitter and Facebook. Built for markets in India and South Africa, there is a surprising potential for these apps as a low-cost cloud computing platform.

Innovation in the Western Countries

The goal of this chapter is not to valuate or rank Western innovators. Many innovations such as the smartphones, the internet or other products come from the Western world anyway. However, it will dress a rapid image of how surprisingly fragile it might react in front of emerging markets such as China.

First, it is important to define what countries we are talking about in terms of “Western countries”. In this work, we will use the definition from Thompson & al (2005), stating that in the contemporary cultural meaning, the phrase "Western world" includes Europe, as well as many countries of European colonial origin with substantial European ancestral populations in the Americas and Oceania.

In the high-technology context, innovation requires high-level of knowledge. For Frankelius (2009), most policy-makers and innovation researchers assume that the highest level of knowledge is usually produced inside universities. It is therefore interesting to examine the Academic Ranking of World Universities 2013 published the Center for World-Class Universities of Shanghai Jiao Tong University[9].

In this ranking, the first non-Western University is Japanese in the 21th rank and there is still debate about whether Japan is or not considered as a Western country. Indeed, it shares many of the attributes of a Western country such as democratic form of government, free market economic system, high standard of living and is contributing significantly to Western science and technology[10]. In the rankings, we can find many Japanese Universities before spotting the first Chinese University at rank 157. Consequently, following Frankelius reasoning, Western countries, with a higher level of knowledge are expected be better technology innovators.

Benjamin Cavender, associate principal at China Market Research (CMR) stated in an interview for Zdnet[11] that even though there is a trend for companies to move certain capabilities to China, it is not likely that China will replace Silicon Valley[12] soon. The Silicon Valley offers an environment where companies, funding and talent are efficiently put

[9] Center for World-Class Universities of Shanghai Jiao Tong University. http://www.shanghairanking.com/ARWU2013.html#
[10] Wikipedia: http://en.wikipedia.org/wiki/Westernization
[11] Zdnet: http://www.zdnet.com/china-takeover-as-tech-innovation-center-inevitable-7000001374/
[12] What is Silicon Valley: http://www.investopedia.com/terms/s/siliconvalley.asp

together and it will be difficult for China to replicate this in the short run. And Silicon Valley is just an example.

In the same interview from Zdnet, Bryan Wang, vice-president and principal analyst at Forrester Research[13], a global research and advisory firm, noted that China is still lacking the entrepreneurial spirit due to the absence of the "creative destructive capability". For him this capability to disrupt existing market norms corresponding to traditional culture, as did Steve Jobs with Apple. The U.S. is a startup-friendly environment, where entrepreneurs are highly considered and failure is not stigmatized, he added.

Nevertheless, the Western companies will have a great challenge in the near future to leverage the forthcoming surge of innovation, in particular in China and India, according to Professor Georges Haour (2007). China is expected to invest more percentage of its GDP in R&D, a GDP that is quickly rising. We will further analyze China's research and development expenditure in an upcoming chapter.

A KPMG survey from May 2012[14] involving 668 business executives showed that technology executives worldwide estimate that China is set to be on par with the United States in terms of tech innovation. 71 percent of business executives polled said China and the U.S. had the most promise for disruptive breakthroughs, and 44 percent of them said the tech innovation center of the world will shift from Silicon Valley to China.

As we can see in this chapter, analysts seem to believe that innovation is still very present in the Western countries and that it might still last some time but many business executives think that China could become the new innovation leader in the future, although it might still take a while.

[13] About Forrester research: http://www.forrester.com/aboutus
[14] KPMG. http://www.kpmg.com/us/en/issuesandinsights/articlespublications/press-releases/pages/china-projected-to-be-on-par-with-us-as-tech-innovation-leader.aspx

Innovation in China

As we can read on Xinhuanet[15], the state press agency of the People's Republic of China, and many other website about China, the torrid growth in China is over but now innovation could be the key to launch it again. China is trying to rebalance the economy by promoting consumer spending, service industries and technological innovation.

In fact, as seen on Xinhuanet, in his report to the 18th National Congress of the Communist Party of China in 2012, Hu Jintao, its former general secretary, said that China has to accelerate to focus on the creation of a new growth model and ensure that development is based on improved quality and performance.

He insisted that top priority must be given to scientific and technological innovation in overall national development with the goal of accelerating the change of the growth model from consumer goods manufacturer to innovation leader.

According to him, China's economy has to focus on knowledge-based production and to look for more value added production. This would allow China to keep a competitive economy in the long run.

In the same report, the vice-chairman of the Central Committee of the China National Democratic Construction Association, Gu Shengzu, said that in this new development period, China's economy should focus on passing from "factor-driven" and "investment-driven" to "innovation-driven" accessing to an improved productivity by means of technological advancement.

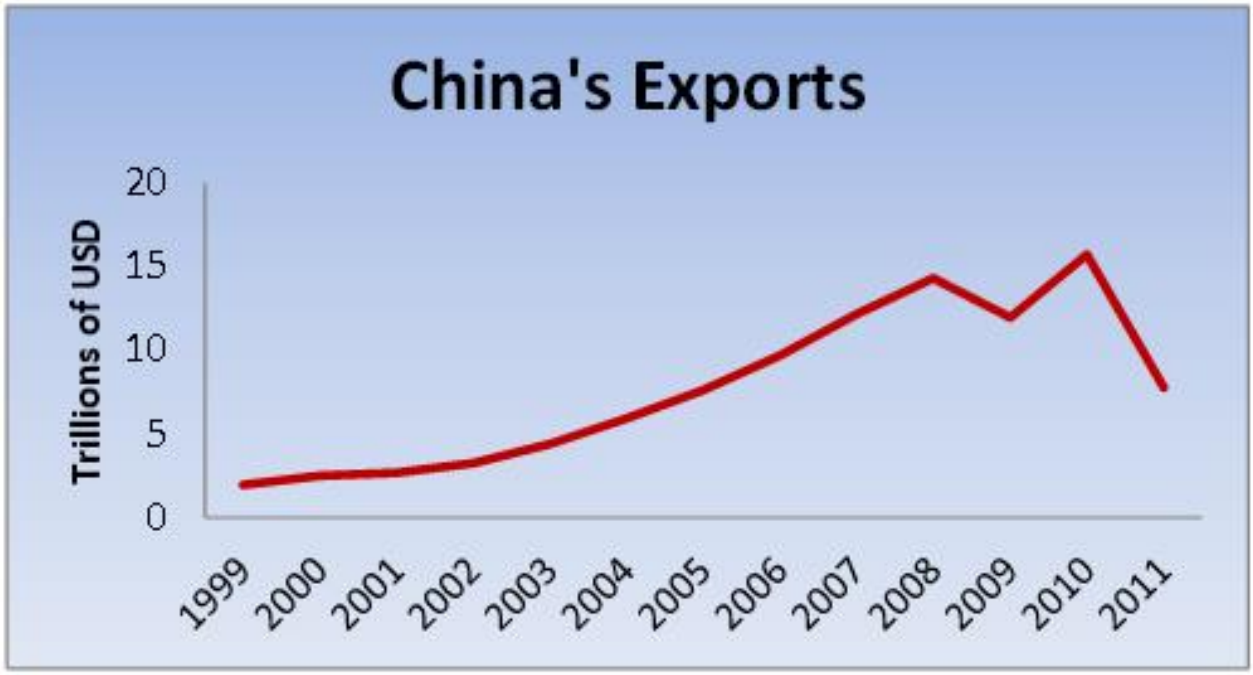
Xinhuanet also writes that analysts agreed that when China loses the competitiveness of low labor cost, it should depend on technological innovation, human capital accumulation and intellectual property protection to ease the pressure of rising costs. It is therefore clear that China has to shift from cheap assembly lines to high value-added production, from cheap consumer goods manufacturer to an innovation leader; from "made in China" to "innovated" in China".

[15]About Xinhuanet News Agency: http://news.xinhuanet.com/english2010/special/2011-11/28/c_131274495.htm

As Haour (2010) says, innovation creates new opportunities and maintains the competitiveness. Making better use of the expertise and technologies available from and developed by universities and public laboratories will help governments and China to be more innovative. Haour also says that China must make efforts in favor of job creation by removing barriers, simplifying regulations and lowering administrative hurdles.

Another aspect we will discuss is the European and American debt crisis. As we can see in the report from Global Financial Data[16], export of Chinese products - mainly manufactured goods - as well as trade surplus decreased. Therefore, China should not try to expand its market but to take other's market. To that extent, the decision to orientate itself to more "innovation driven" seems to be the best option available.

Figure 3 - China's Exports from 1999 to 2011



Source: Global Financial Data (2011)

[16] Global Financial Data: https://www.globalfinancialdata.com/news/Articles/ChinaTrade.pdf

Figure 4 - China's Trade Surplus/Deficit from 1991 to 2010

Source: Global Financial Data (2011)

As we know, many big firms such as Apple, Microsoft or Cisco, are producing their IT products in China by now. Many huge companies are involved in this production such as Foxconn[17] that is already producing its own products now. After reading the literature about the situation, it appears that once China will be able to innovate and to create its own products from A to Z. Western competitors might have a hard time to compete and it would not be surprising for us that Chinese plants could favor locally innovated products over foreign orders.

Positive Aspects for Innovation in China

Govindarajan (2012) describes the advantage that developing countries have is that new systems do not need to be compatible with the old ones when innovative infrastructures are used. Therefore, non-existing infrastructure in the developing countries allows introducing the latest technology from scratch. For example, Beijing airport is more modern and has a more cutting-edge technology than New York's JFK airport.

The same manuscript depicted that emerging economies will have a great role to play for innovation in the future. For example, William f. Achtmeyer Chairman and Managing

[17] About Foxconn: http://www.foxconn.com/CompanyIntro.html

partner of the Pathenon Grou is cited in the manuscript saying: "The emerging economies are not only the growth markets of the next century, but they will also be a great source of idea making." (Govindarajan, 2012)

As mentioned in an earlier chapter, the Chinese government will give support for innovation and there is no debate of the fact that there are good market opportunities and strong capital availability in China, the number one country in population and the second GDP of the world. On the website of the World Trade Organization[18], we can see that China was in 2012 the first country by exports and the second by imports.

For Benjamin Cavender19, the associate principal at China Market Research, it is sure that there will be increasing opportunities for development in China thanks to the government incentives I mentioned in an earlier chapter and the emergence of high-tech zones that could look alike the Silicon Valley[20]. He also mentions the fact that a large body of entrepreneurs and graduates with technology expertise will be another asset. However, Cavender says that this development will not necessarily be at the expense of the Silicon Valley although it might in the long run very well be the case.

Barriers for Innovation in China

As we have seen before, some analysts such as Cavender think that China will not catch something like the Silicon Valley that offers an environment where companies, funding, and talent pool together efficiently in a place that is hard to replicate and that China seem to lack the skills to disrupt existing market. Cavender also thinks that that China is less startup-friendly than the Western world[21].

There are other concerns, specifically in the IT field, including the smartphones. Michael Yoshikami (2012), CEO and founder of U.S.-based Destination Wealth Management[22],

[18] Wolrd Trade Organisation. http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Country=CN& consulted the 12th of February 2014
[19] Zdnet. http://www.zdnet.com/china-takeover-as-tech-innovation-center-inevitable-7000001374/ consulted the 14th of March 2014
[20] What is Silicon Valley: http://www.investopedia.com/terms/s/siliconvalley.asp
[21] Zdnet. http://www.zdnet.com/china-takeover-as-tech-innovation-center-inevitable-7000001374/
[22] About Destination Wealth Management: https://www.destinationwm.com

warned in an article from Zdnet[23] about the concerns around security over technology deals. In fact, the news regularly report the U.S. accuses China to be cyberspying and the fact that many of the technological devices are produced in China may allow its government to equip the hardware with spy technology.

Zdnet also writes in its article that in some overseas markets, new laws could retain companies from supporting political oppression, following Matt Walker, principal analyst at Ovum's Network Infrastructure Telecoms[24]. A political tendency caused by some reluctance over allowing China-driven deals due to paranoia?

In an MIT technology review from Yasheng Huang[25,] international program professor in Chinese economy and business at MIT Sloan School of Management and the founder of China and India Labs, we learn more about China's potential problems. First, the review points out that the massive technological investments have less impact than expected because of the fact that the investments are made in an environment of "republic government" rather than "republic of science". The universities in China are controlled by the Ministry of Education and their presidents and deans are very powerful, much more powerful than in the U.S.. They are considered as company employees. The research projects are usually initiated from the top down and not by the professors and researchers. Data sharing is difficult across bureaucracies, and the dissemination of research findings often have to take a back seat to the political needs of maintaining "stability".

Mr. Huang also mentions in his review that China has already invested heavily in research and development, with little impact on growth however. To be effective, technology-based growth drivers would require more than copying other countries' technologies and business models. As we have mentioned in the introduction, the GDP per capita and its variation over time in China differ essentially and because of this, China requires a different socio-economical approach. Currently absent elements need to be built up: intellectual property protection, freedom to think and challenge authority and a government with limited reach and power.

[23] Zdnet. http://www.zdnet.com/rise-in-chinese-funded-acquisitions-could-trigger-more-hurdles-2062304862/
[24] About Ovum Network Infrastructure Telecoms: http://ovum.com/about-ovum/
[25] MIT Technology Review. http://www.technologyreview.com/view/507431/chinas-innovation-success-depends-on-political-changes/

The MIT review concludes saying that for these reasons, China has now to prepare for this institutional transition that will require vision and political courage to acknowledge the shortcomings of China's current growth model and prepare the groundwork for a new approach. This will require political reforms and not a simple tweak of the existing system and this will take time.

China is therefore in a very good position to transform its model of growth to innovation-driven but as we have seen in this chapter, the process might not be immediate.

China's Current Economic Situation and its Implications for Innovation

If we are to discuss innovation in China in the future years, it is very important to understand what is happening there. As we will see, China went from a consumer goods manufacturer to a huge investor in construction which might be a major risk. Innovation should follow, but let us first take a look at the state in which China is today to understand why this change of the growth model is so important for this country creating huge cities at an extraordinary rate.

The Indebtedness Situation

In a documentary from the BBC[26], the world's leading public service broadcaster, dating from February 2014 called "How China Fooled the World", with Robert Peston. we learn a lot about the dangerous situation in which China is today. After the September 2008 crisis, many Chinese companies had to lay off employees because of the weakening demand. As George Magnus, the former Chief Economist at UBS[27] explains in the documentary, the Chinese government was worried about the decline of growth, because high growth gives the communist party its legitimacy. Therefore, two months later, the Chinese government unveiled its plan to reboots growth: invest more. In a state dominated economy you can easily switch on investments.

China was already investing in a huge scale and began to invest even more, mostly in construction[28]. Investments went from below 40% of the GDP to 50%. China therefore launched in 2008 a 586 billion US dollar stimulus for two years[29] which represents the biggest building program in history. To give an idea of the magnitude of this program, the BBC documentary explains that it represents one new skyscraper every 5 days, more than 30 new airports, 25 metros in 25 cities, high-speed railways, the 3 longest bridges in the world, 26 thousand miles of motorways, and all this in a 5 years program.

The question raised by the documentary is: how can they invest so much so fast? The Chinese government still owns a big part of the economy since communism is still very

[26] About BBC: http://www.bbc.co.uk/aboutthebbc/insidethebbc/whoweare/ataglance/
[27] About UBS: http://www.ubs.com/global/en/about_ubs/about_us.html
[28] Sources from this chapter are from the BBC documentary of 2014 "How China Fooled the World".
[29] New York Times. http://www.nytimes.com/2008/11/10/world/asia/10china.html?_r=0

present in China. However, only a fraction of the money came from tax payers and state funds, most of it was borrowed from banks. In the first year, Chinese banks lent almost a trillion pounds. And this is only what the unreliable official figures say. In 2010, the government feared that this would get out of hand and asked the banks to slow down. However, the government encountered difficulties and local officials created new ways of funding, so called shadow banks, financial intermediaries involved in facilitating credits across the Chinese financial system, but whose members are not subject to regulatory oversight[30]. This led to a huge debt by the local entities, outside of the supervision of the central government. A huge proportion of China's big debts is therefore hidden from the government itself.

A lot of that lending went for developing the necessary infrastructure for the huge amount of Chinese people moving from rural areas to the cities. The paradox of this situation is that these new buildings sold very expensively are often bought by a rich minority as a financial investment, not to live in them. Following Jinsong Du, a property analyst from the Crédit Suisse[31] interviewed in the documentary, estimation is that there is a 15% oversupply of the housing in China. The more expensive the property is, the bigger the vacancy rate becomes.

This shows that the Chinese government and local authorities invest massively and undertake project after project, even though the economic return is not justified. This is true not only for houses but for many great constructions such as Olympic team sport complexes, exhibition halls or other costly structures in places with low average wages. China is building monuments such as we can found in big European cities in places with only 100'000 people and low revenues.

Charles Liu, the Chairman of Hao Capital[32], a China focused private equity firm, explains that Beijing cannot manage to stop this boom since it is making thousands of local officials very rich. They expropriated lands and sold them on to the developers. Many are sent to jail now. Charles Liu thinks that there is a generational issue. Chinese people have been poor for a long time and when they see an opportunity to make money they take it. In a country of 1.3 billion, there are not enough people with enough educational, cultural, social

[30] Investopedia. http://www.investopedia.com/terms/s/shadow-banking-system.asp
[31] About Crédit Suisse: https://www.credit-suisse.com/about_us/en/
[32] About Hao Capital: http://www.haocapital.net/abouten/show.php?lang=en&id=108

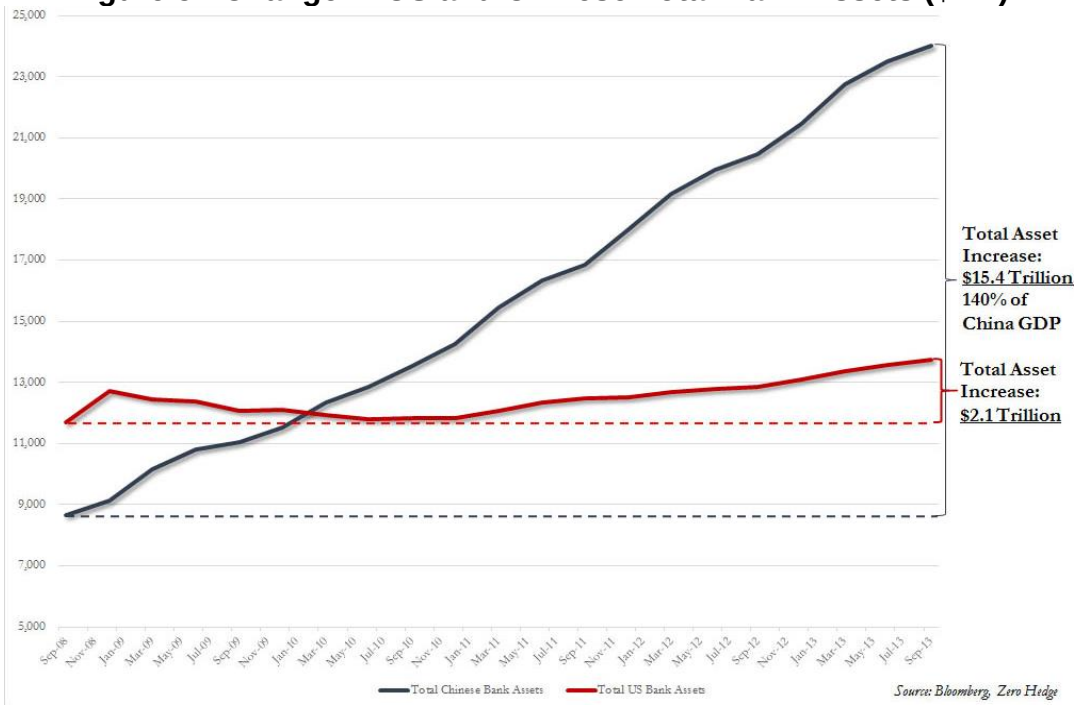
and moral standards to fill all the local positions and to supervise policies. This problem will take time to address and solve, similarly as the time for the innovation investment to take effect.

Fear of a possible crisis leading to a sudden halt of the investments seems justified. Indeed, in the middle of 2013 and again before Christmas 2013, the documentary explains that alarms started to sound with the questions of if the crisis of 2008, which could happen in China now. The interbank interest rates shot up to very high levels as relates George Magnus from UBS, which is very unusual in the case of China. If there had been an extended inability to borrow, this would have been fatal for some Chinese banks and very expensive for the Chinese government which would have felt the need to bail out the bigger banks, leading to a fall of Chinese economy in case of a loan freeze. As a response, the Chinese Central bank, the People's Bank of China decided to pump new liquidity back into the banks. The situation went back to normal but now the world is aware of the fragility of China's economy. As we can see in an article written by Jasmine Ng for Bloomberg[33] in January 2014, this pumping of cash effectively led to a rise of the stocks in Hong Kong, showing its effectiveness and sensitiveness.

Charlene Chu, a senior director of Fitch[34], says in the BBC documentary that the scale of the lending is off the chart. At the beginning in 2008, the Chinese banking sector was roughly 10 trillion US dollars and is now in the beginning of 2014 on the order of 24 to 25 trillion dollars. This incremental increase of 14 to 15 trillion dollars is equivalent to the entire US banking commercial system that took 100 years to be build, all that in half a decade! This also mean that Chinese total indebtedness is now equal to twice the value of everything it produces (its GDP) as Robert Peston, the reporter, mentions.

[33] Bloomberg. http://www.bloomberg.com/news/2014-01-21/hong-kong-stocks-advance-as-china-s-central-bank-pumps-in-cash.html
[34] About Fitch: https://www.fitchratings.com/web/en/dynamic/about-us/about-us.jsp

Figure 5 - Change in US and Chinese Total Bank Assets ($BN)



Source: Bloomberg (2013)

A solution would be to abandon an old Chinese tradition which is to save a third of the money they earn. There is an imbalance between the indebtedness and the spending of the Chinese people. Chinese people need to consume more to balance the economy. Consumption in China accounts only for one third of the economy compared to two thirds in the Western one. Investment represent half of it, therefore, a challenge for China is to manage to replace some of the investments by more consumption. In this context, the smartphone market is very relevant as we will see later in this study; it is a fast growing market, very appealing to Chinese people.

Credit growth in 2013 is still twice as fast as GDP growth following Charlene Chu and mathematically there is no way to grow out of this problem. The longer it goes on, the bigger the interest bill, the greater the risk for the different actors and the bigger the danger.

For Jinsong Du from Crédit Suisse, the scary moment will be when someone will panic and will want to sell his assets. If enough people think that way, this would be the trigger point for a major correction in the market, leading the prices down. If the real estate prices were to collapse, this could lead to a loss for the people who could not be able to pay their

debts, causing more difficulty for the banks. Millions of Chinese who invested in housing as a substitute for pension could turn their anger towards the government, which has all interest to avoid that situation.

For Charles Liu from Hao Capital, China needs a quality difference of the content of the growth to higher added value which corresponds with what we saw earlier in this study when we pointed out that the Chinese government wanted to concentrate on improved quality and performance. For George Magnus, China might be in 2014 where the West was in 2005-2006 which means that China would not be in imminent danger but getting closer. Lord Turner, from the Institute for New Economic Thinking[35], adds that we have never seen in the past such increase of credit without producing some sort of financial crisis in the end.

With all these debts, we could think that the Chinese government would begin to cut its investment to avoid the crisis. However, this is not what is happening. The second of April 2014, China announced that it would boost its stumbling economy by cutting taxes for small firms and investing in railway lines[36]. In its article about it, Reuters mentions that it is the first concrete action being taken by China this year to boost its economy. This decision comes one week after the Premier, Li Keqiang reassured the jittery markets, stating that Beijing was ready to provide support. Reuter notes that the cabinet also said in another statement on the government's website that it will find innovating ways, including fiscal and financial methods to steady the economic growth. The government said in March that it aims now to have a growth of around 7,5% in 2014.

Once again, this investment will be partly financed by bank loans, worsening again the situation mentioned earlier in this chapter. In fact, Reuters ends its article speaking about how infamous these railways projects are because of the corruption surrounding them and because of the heavy debt loan problems. The corruption even resulted in the dissolution of the Ministry of Railways in March 2013 and the railways projects are now managed by China Railway Corp.

[35] About the Institute for New EconomicThinking: http://ineteconomics.org/about
[36] Reuters. http://www.reuters.com/article/2014/04/02/us-china-economy-tax-idUSBREA3114L20140402

The Chinese government, which - as The Diplomat writes[37] - holds trillions of US dollars in assets, (lands, natural resources, state-owned monopolies and $3 trillion in foreign exchange), could not simply repay these debts to the local governments. The article of the diplomat explains the long term effect of what might soon become massive non-performing bank loans owed to state banks by local governments. It will likely manifest itself not in form of a banking crisis but with a growth lowering since China would have to end its demographic dividends and increase the costs of healthcare and pensions. This would result with China having less capital to invest which in the case of this investment-led economy would lean to a more sluggish growth.

During a commodity trading class at the HEG, the teacher pointed out something very important explaining why it is so important for China to keep an important growth: legitimacy. Mr. Piller, the commodity trading teacher, stated that the system is currently functioning in China not because people like the government but because it is working; people can eat, have a habitation and feel safe, therefore no revolt is in sight. However, after the Arab spring, it is interesting to think about the consequences a lowering growth could have on this quite authoritarian government. This is really why the Chinese government has to make efforts and is trying to turn their economy into an innovation driven growth, since it cannot continue eternally the artificial growth focused on investment. Exports of manufactured products are not enough to sustain its growth, as we have seen.

A last point we have to note is that even though the growth is actually slowing down, as Yusuf Alireza, the CEO of Noble Group[38], said in an interview during the Financial Times Commodities Global Summit 2014 in Lausanne; even if China's growth is lower, in an absolute matter the absolute GDP is still increasing more than the years before. It is good to remember that should the Chinese growth slow down, its absolute growth will still be higher than the year before.

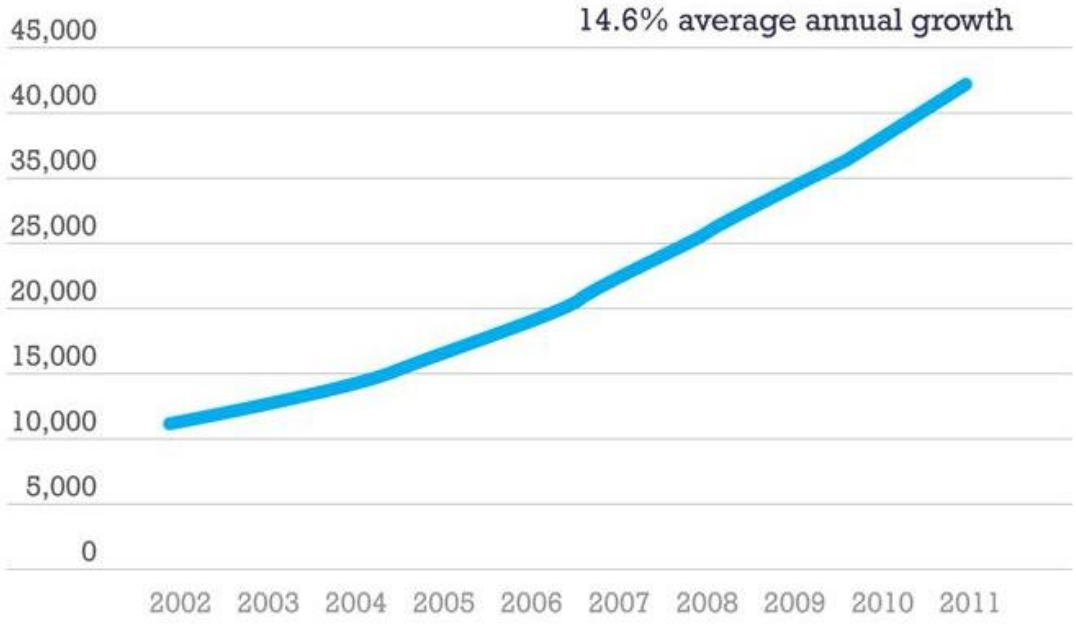
[37] The Diplomat. http://thediplomat.com/2011/07/chinas-ticking-debt-bomb/2/ consulted the 9th of April 2014
[38] About Noble Group : http://www.thisisnoble.com/index.php?option=com_content&view=article&id=29&Itemid=50

The Relocation of Low-cost Manufacturers out of China

As we have seen, Chinese growth depends a lot on exports of finished products, which decreased after the 2008 crisis which gave to the Chinese government the incentive to invest heavily in construction. Another problem that is rising is now that the wages are increasing in China as we can see in an article of Bloomberg from January 2014[39]. This wage increase is driving many low-cost manufacturers out of the country. The Wall Street Journal[40] relates an example of Lever Style, a company that was producing clothing in China for clients such as the Japanese retail chain Uniqlo and moved to Vietnam now, where wages can be half to those in China. The Wall Street Journal explains that this is a matter of survival for low-cost manufacturers after a decade of nearly 20% annual wage increase in China and Lever Style says it can no longer make money by staying in China. "The trend of shifting low-end manufacturing bases to Southeast Asian countries will only accelerate," said Shen Jianguang, chief Asia economist at Mizuho Securities Asia Limited[41] in Hong Kong, who formerly worked at the European Central Bank and International Monetary Fund. These higher wages could maybe raise the low level of consumption mentioned in an earlier chapter but it will probably not counter the loss in exports in the GDP.

[39] Bloomberg. http://www.bloomberg.com/news/2014-01-06/china-wages-seen-jumping-in-2014-amid-shift-to-services-.html
[40] The Wall Street Journal. http://online.wsj.com/news/articles/SB10001424127887323798104578453073103566416
[41] About Mizuho Securities Asia Limited:http://www.mizuho-sc.com/hk/company-profile.html

Figure 6 - China Annual Wage Increase, 2002-2011



Source: Bloomberg, National Bureau of Statistics of China (2011)

In an article from Bloomberg[42], we learn that China's wages are set to increase by 10 percent or more in 2014. In fact China's ruling Communist Party is pushing this tendency, in order to retain public support for the reasons mentioned earlier, and to accelerate the nation's shift away from polluting and capital-intensive manufacturing to a more services-driven economy. However, in the light of the heavy commitment in the investment in construction, it is hard to know for sure if the reduced growth caused by these relocations will effectively be replaced by an increased service economy or higher-end product or, as we have mentioned before, by more construction projects. This point will be important to follow in the following years.

[42] Bloomberg. http://www.bloomberg.com/news/2014-01-06/china-wages-seen-jumping-in-2014-amid-shift-to-services-.html

The Smartphone Market in China

China is the biggest smartphone market as we can read it in an article in Reuters[43] and this market will probably ship more than 450 million devices in 2014, which represents at least a quarter more than the year 2013. As the website Techinasia[44] relates, in 2013 351 million new smartphones were shipped to stores across China. This increase will be driven by the government issuance of 4G licenses and because China Mobile Ltd., the world's biggest wireless operator, would sell Apple's smartphones.

As we can read in a press release from the research firm IDC[45], China's smartphone shipments are expected to reach 420 million units in 2014, with a year-on-year growth of 19.8%, which is a lot lower than the steep 63,6% growth in 2013. As James Yan, the Senior Analyst of the Client System Research in IDC explains, the growth rate will remain relatively high. But since the smartphones are now popularized in China, the sales market will therefore shift from "new" to "upgrade and replace".

Because of the importance of this market in China and in the world and the fact that it is a very innovation dependent sector, we decided to use it to estimate the possible consequences of the wish of the Chinese government to invest in innovation, and if innovation pays off.

The Research and Development in China

China has the world's largest and fastest growing market in mobile telephony (Haour, 2007). Consequently, the major Western actors in this industry and Samsung, the leader[46], have a substantial R&D presence with hundreds of people working in China.

Haour (2007) writes that companies locate R&D centers in countries far from their base for two main reasons, the fact that these countries offer a large and dynamic market and they have talents. However, the argument of lower costs does not seem to constitute a side-

[43] Reuters. http://uk.reuters.com/article/2013/09/24/us-china-smartphones-idUKBRE98N08V20130924

[44] Techinasia. http://www.techinasia.com/idc-says-351-million-smartphone-shipments-china-2013/

[45] IDC. https://www.idc.com/getdoc.jsp?containerId=prCN24688114

[46] Reuters. http://uk.reuters.com/article/2013/09/24/us-china-smartphones-idUKBRE98N08V20130924

benefit since the wages for R&D represent a small part of their expenses, and these lower wages might anyway not last long. The fact that R&Ds are located in these countries far from their bases generates problems such as language and time-zones differences and, more importantly, the cultural differences and unfamiliarity with the framework in the country.

For example, in a case study concerning Lenovo computers in the "Exploring Corporate Strategy" book by Johnson & al. (2008), we see that when Lenovo acquired IBM's personal computer business in 2005, it created many problems of time zones and of culture. For example, when the representatives of Lenovo arrived in the U.S., no one from IBM went to the airport, which is very bad mannered in the Chinese culture, and many people in Lenovo spoke a very bad English. The vice president for human resources of Lenovo also commented that American people like to talk while the Chinese like to listen and they were wondering why the American people kept talking even when they had nothing to say. Gradually, the Chinese people learnt to be more direct and the American ones to listen more. This shows the difficulty of having different branches of a company in different countries and the difficulties Western companies can meet when they choose to outsource their research and development in China, difficulties that Chinese companies do not meet.

The Chinese Smartphones Emergence

Some fully Chinese companies are now appearing in China. For example, we can see in an article on The Verge of October 2013[47] that in only three years of existence, the Chinese company Xiaomi Tech has sold 20 million smartphones, which represented five percent of the Chinese smartphone market. Xiaomi was already evaluated at 10 billion dollars after these three years of existence. In an interview by the Wall Street Journal[48], its founder and CEO Lei Jun explained that this growth could exist thanks to the user feedback to add new features to the upcoming smartphones, and a focus in quality that makes Xiaomi's smartphones have a similar value than the iPhone 5C that was launched

[47]The Verge. http://www.theverge.com/2013/10/9/4819346/xiaomi-profiled-wall-street-journal
[48] The Wall Street Journal. http://online.wsj.com/news/articles/SB10001424052702304441404579120901140934562?mg=reno64-wsj&url=http%3A%2F%2Fonline.wsj.com%2Farticle%2FSB10001424052702304441404579120901140934562.html

in China. The Wall Street Journal also states that Lei Jun is someone who has the desire to be innovative such as Steve Jobs, a proof that innovation for high technology products also exists in China. Forbes points out that this very fast growing company already present in China, Taiwan, Hong Kong and Singapore and will be present in India, Brazil, and Russia as well as Indonesia, Malaysia, Mexico, the Philippines, Thailand, Turkey, and Vietnam by the end of 2014. In the end of 2013, the website The Next Web[49] stated that Xiaomi has already sold almost 26 million phones, 7 million in 2012 and 18,7 million in 2013, and its CEO Lei Jun announced a targeted sales figure of 40 million new smartphones in 2014, continuing this extraordinary growth.

Reuters[50] mentions how the Chinese market is dominated by Samsung. It is hard to find recent figures about the brands sold in China, a market dominated during a long time by Samsung. But with its very fast expansion, Xiaomi's CEO and industry analysts think that Xiaomi will become the number one brand in China, as the website Thestreet[51] relates.

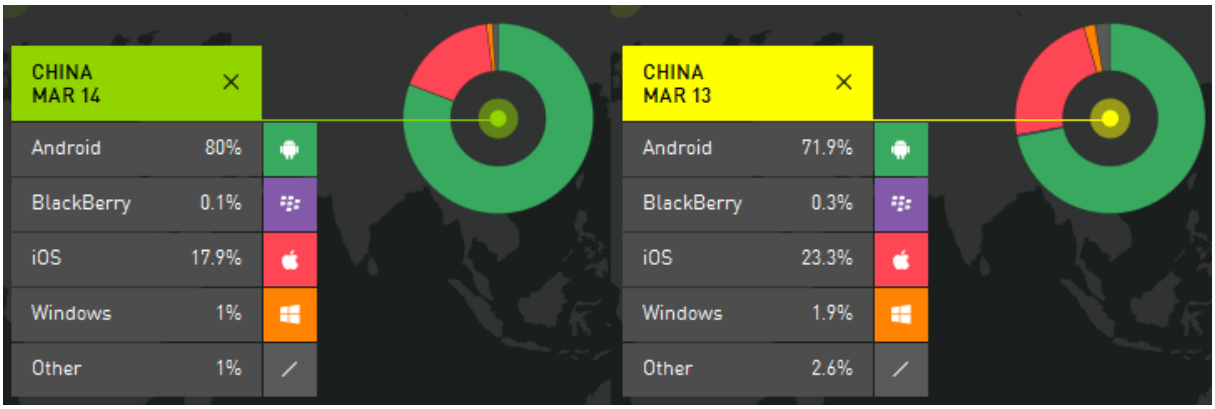
The Wall Street Journal continues its analysis with the Xiaomi's Mi3 smartphone which is a very good example to show the iPhone 5C and Samsung Galaxy S4 problems in China. For only 300 dollars, the Mi3 has even some better technical specifications that the iPhone 5C. An interesting discussing about smartphones with Chinese students in exchange at the HEG owning the Xiaomi's Mi3 showed how they largely preferred to buy Chinese smartphones, since they are of equal quality than the Samsung or Apple's ones but at a much cheaper price. Indeed, when we tried their devices we did not see much difference with an Apple or Samsung smartphone. Another interesting fact from this discussion is that one of these students had to try three times before receiving her smartphone. She explained that there is so much demand that Xaomi puts an announcement online saying that at a specific day and at a specific time, people will be able to order a limited amount of smartphones. This student told us that in some minutes all the smartphone available were sold out. She also related that Xiaomi was only selling their phones on internet and although it might be possible to find it in on physical stores, it would be against a higher price, since the shop owner would have bought it on Xiaomi's website. The fact that

[49] The Next Web. http://thenextweb.com/asia/2014/01/02/chinas-xiaomi-sells-18-7-million-smartphones-in-2013-up-160-from-a-year-earlier/
[50] Reuters. http://uk.reuters.com/article/2013/09/24/us-china-smartphones-idUKBRE98N08V20130924
[51] The Street. http://www.thestreet.com/story/12629020/1/chinas-answer-to-the-iphone.html

phones are sold only through internet is one explanation of the low price alongside the advantage of local and large scale production, with a free operating system.

As it happens, something helping big firms such as Lenovo, ZTE or Huawei to have success in China is explained by techinasia.com[52]: it is the fact that China is an Android nation with an estimated 300 million Android users by the end of the year 2013. Android is a free OS that can be installed on a great variety of smartphones and be personalized. It gives the opportunity to many Chinese phone makers to have only to worry about the hardware, since the software part is taken care of by Google. A recent study by Kantar Worldpanel[53], the world leader in consumer knowledge and insights based on continuous consumer panels dating of April 2014 even shows that Android is progressing. Its market share was 71,9% in March 2013 and is in March 2014 80% with iOS loosing 5,4% from 23,3% to 17,9.

Figure 7 - OS Market Share in China for March 2013 and 2014



Source: Kantar Worldpanel (2014)

The same study also points out the fact that the phablet[54] growth is very high in China. Phablets made up 40% of smartphone sales in March in China, following the general trend of bigger streams that even Apple is now following with rumors of a bigger iPhone in the future as Forbes[55] related in April 2014.

[52] Techinasia. http://www.techinasia.com/china-cool-homegrown-smartphones-2013-infographic/
[53] Kantar Worldpanel. http://www.kantarworldpanel.com/global/News/Apple-regains-momentum-as-Windows-stutters
[54] "A phablet is a smartphone having a screen which is intermediate in size between that of a typical smartphone and a tablet computer". http://www.oxforddictionaries.com/definition/english/phablet
[55] Forbes. http://www.forbes.com/sites/anthonykosner/2014/04/24/the-sleek-large-screen-iphone-6-emerges-as-the-leaks-suddenly-get-physical/

Analysis of Data

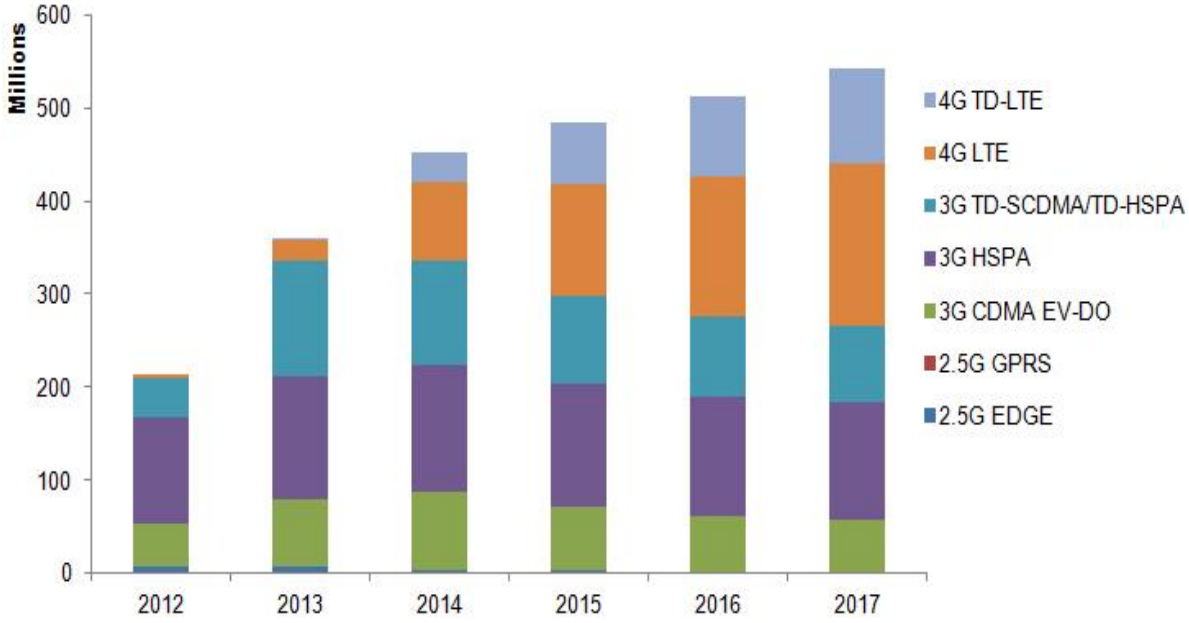
After having done a literature and a market review in this study, we will now look at some market data. One of the objectives of this study is to show whether there is a clear growth of innovation in China and in the smartphone market. In order to analyze this, we chose to look at two innovation indicators in China and at the Chinese smartphones shipments and exports.

Smartphone Market Data

China Smartphone Shipments

It has been difficult to find solid data concerning the smartphone production in China. The best that we could find is this graph using data from the International Data Corporation[56] showing the smartphone shipments in millions in 2012 and until the second quarter of 2013 and a forecast of the shipments to 2017[57].

Figure 8 - China Smartphone Shipments by Air Interface (2012-2017)



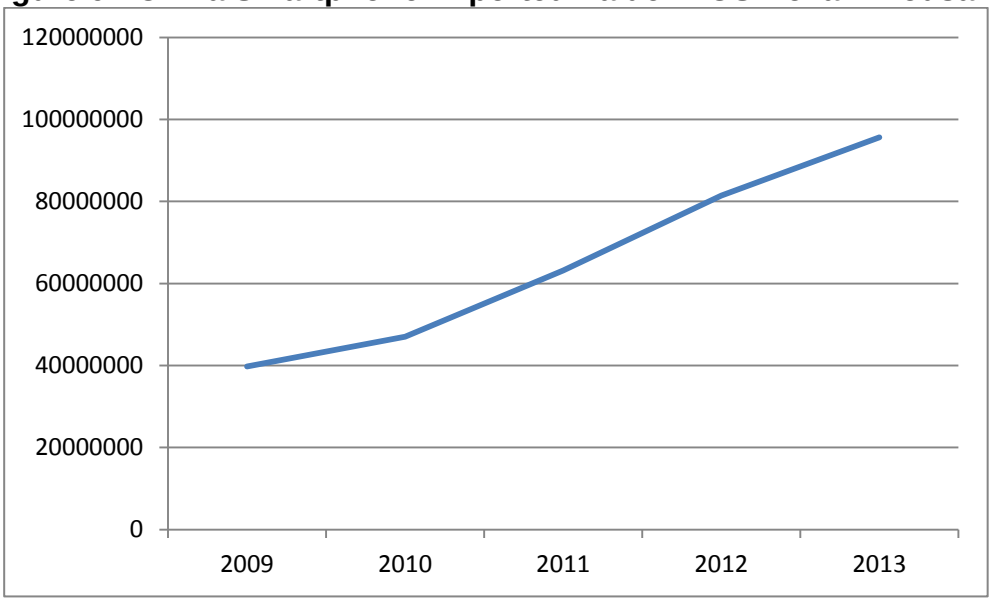
Source: IDC China Quarterly Mobile Phone Tracker (2013)

[56] About IDC: http://www.idc.com/about/about.jsp
[57] Graph available at http://www.idc.com/getdoc.jsp?containerId=prCN24344613

Number of Smartphones Exported from China

This graph represents the exported value in US Dollar thousand for the "Telephones for cellular networks mobile telephones or for other wireless network" which was described to us as being the description of the smartphones on the International Trade Center website[58][59] by Miss Pitchaya Sam Eamon, an associate market analyst working in this agency.

Figure 9 - China Smartphone Exported Value in US Dollar Thousand



Source: International Trade Center (2014)

The Innovation Indicators

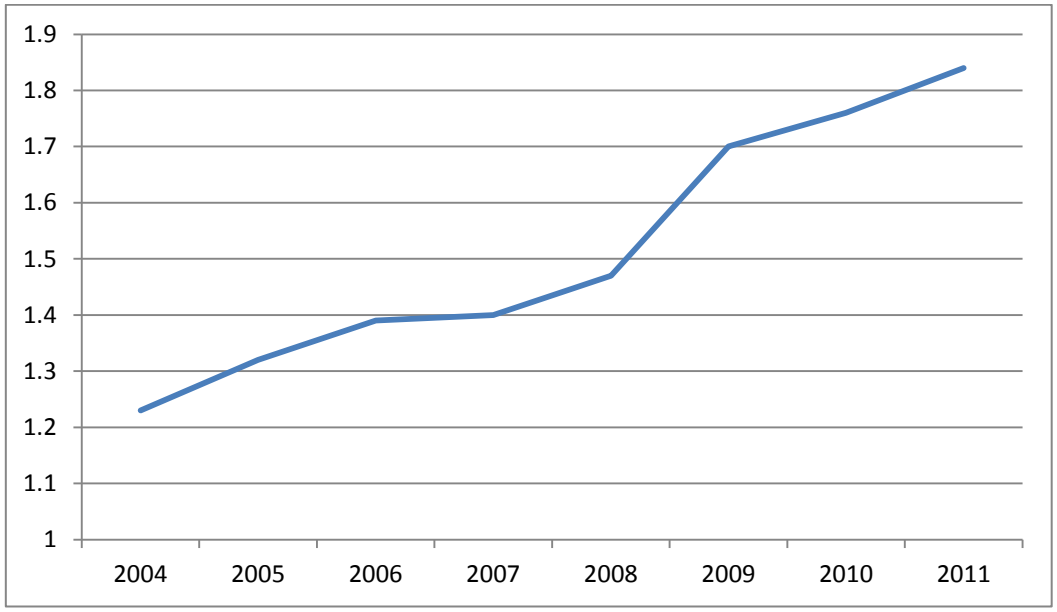
In an article of Kleinknecht & al. (2002), we see how difficult it is to choose innovation indicators. It was found in their study that the different indicators used all had biased elements and did not correlate together, they were all saying a different story. We learned in this article that the two most frequently used indicators are the Research and Development expenditures and the patents. We will therefore use these indicators in this study, remembering to be careful about the interpretation of the results since they might have biased elements.

[58] About the ITC: http://www.intracen.org/itc/about/
[59] Data available att http://www.trademap.org/ProductRev_SelProduct_TS.aspx?nvpm=1|156|||851712|||20|1|1|2|2|1|1|1|1

The Research and Development Expenditure as a Percentage of the GDP

This graph represents the research and development expenditure as a percentage of the GDP for the years 2004 to 2011. The data come from The World Bank[60] and represent "the expenditures for research and development". They are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. Research and development means basic research, applied research, and experimental development.[61]

Figure 10 - China Research and Development Expenditure as a Percentage of the GDP



Source: World Bank (2014)

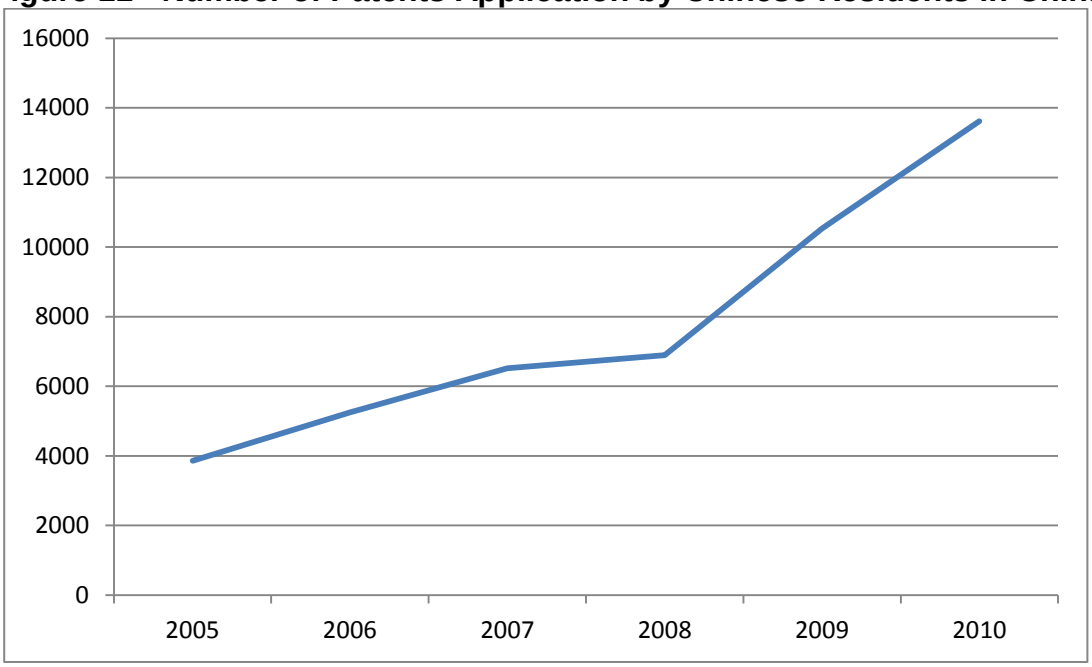
Number of Patent Applications in China

This graph shows the patent applications by Chinese residents.[62] It represents patents for exclusive rights for an invention, a product or process that provides a new way of doing something or offers a new technical solution to a problem. A patent provides protection for the invention to the owner of the patent for a limited period, generally 20 years. In China

[60] About The Wolrd Bank : http://www.worldbank.org/en/about
[61] Data available at http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS
[62] Data available at http://data.worldbank.org/indicator/IP.PAT.RESD/countries

the term for invention patents is 20 years from the filing date. The term for utility model patents is 10 years from the filing date.[63]

Figure 11 - Number of Patents Application by Chinese Residents in China



Source: World Bank (2014)

[63] European patent office : https://www.epo.org/searching/asian/china/faq.html#faq-476

Findings

As we thought, the figures shown in the analysis confirmed our expectations after having done our literature and market analysis and since there is no surprise, most of the comments concerning these numbers coincide with our previous findings.

First, we can see that there is a great increase in smartphone shipments and that this growth is forecasted to continue until at least 2017. Secondly, we can also see that from 2009 China is exporting every year more smartphones, a tendency that will probably continue in the future as – as mentioned in a previous chapter – actors like Xiaomi Tech are growing very fast and plan to open themselves to more countries in the close future.

Concerning the innovation indicators, it is interesting to see that China is investing each year more percentage of its GDP. As mentioned before, their GDP is constantly growing, which means that it is every year a higher proportion of a higher sum that is invested in research in development which fosters the development of innovation in China more and more.

Finally, we can clearly see that each year more applications for patents are field in China, showing that China has every year more innovative products or processes to protect.

This analysis shows that China's strategy to invest more in innovation seems to be working and that it might be on the right track to become an innovation leader in the years to come if it does not meet a crisis caused by its indebtedness situation.

Conclusion

Concerning our first objective which was to define innovation and reverse innovation, we learned that innovation is a term with many definitions but with some common aspects. The important common parts of these definitions seem to be that it is something new, introducing a good or a significant improvement in the quality of an existing good, something that induces positive changes in efficiency, quality, market share, productivity or competitiveness and that innovation and entrepreneurship are the main triggers for the long-term success of a company. Concerning reverse innovation, to summarize it in one sentence, it is the ability to innovate specifically for the emerging market. Moreover, the chapter about reverse innovation introduces a broader topic about how the Western companies might have to do in order to take some market share to the Chinese giant companies and it will be interesting in the future to look if some giants of the smartphone market such as Apple or Samsung will use reverse innovation to acquire a higher market share in China.

In relation with the second objective, we have seen that the Western countries still have a solid stronghold concerning innovation. However, the Chinese government wishes to invest more in innovation and it is showing success. We saw that there are many positive aspects for innovation but also some difficulties. It will be interesting to see whether China can transition into a more capitalistic system to be able to get rid of the barriers and use its full potential or if it will fail to reform its system and to deal with its indebtedness situation.

The analysis of China's current economic situation and its implication for innovation showed that China is a country that is developing extremely fast and that even though the growth is getting slower in percentage, in absolute value it is another story. However, we have also seen that China might have trouble in the future because of its heavy investment in construction at the expense of other sectors. As we have seen, one solution is to invest in innovation which is what the government is effectively doing more and more. We can already see in the smartphone market how innovating companies can not only produce smartphones of a similar quality to Samsung or Apple, but more importantly do it at a much lower price.

The analysis of data concerning the smartphone production and exports and the innovation indicators showed a clear growth of the Chinese smartphone production and

exports and a clear increase in research and development investment and in patent applications. This confirms what we have seen in the objective two and three and allows us to have an unbiased view of a complex situation.

After doing this large amount of research we thought about two possible scenarios about Chinese short term future.

The first one is that China successfully transforms its investment driven economy to an innovation driven economy. If it manages to do it, a situation of almost monopoly could arise. As China would own the complete production chain, they would be consumer goods manufacturer but also innovation leader. The Western companies that produce in China would encounter great problems to stay competitive. In this case, we would experience an end of a cycle with an economic center shifting back to the East. An interesting question would be to look at their distribution capacity in future studies.

However, Western countries might have an option to counter this situation; reverse innovation. We think that the Western companies should soon find out a viable way to be able to use reverse innovation in addition to the glocalisation they already use in order to take a significant market share in China and in the rest of the emerging market and not let emerging giants take their positions.

The second scenario would be that China does not successfully and sufficiently transform its model of growth which would lead to an economic crash, leading to a depression. We have seen that some analysts think that China is in a situation comparable to 2006 in the Western countries, and therefore that a big crisis could happen in some years. Their advantage is that they can learn from the Western events and try to avoid this situation but it is not easy when 50% of your GDP represents government investments and as long as Chinese people save a third of what they earn.

It is important to keep in mind that this subject is very complex and for this study we had to focus on some aspects in relation with innovation. Other important things that are happening now, for example the problem of China's aging population. Because of the birth control by the government that leads to a lower fertility rate. The population is aging and there will be less and less people to pay for the old generation. This is interesting to take into account in a long-term view of Chinese innovation and possible position as a future

technology leader. The question in this case is: if China becomes an innovation leader, how long will it last?

Bibliography

ALIREZA, Yusuf, 2014. “Noble on China’s commodities appetite”. *Financial Times Video* [online], April 2 2014 [Accessed 4 April 2014]. Available from: http://video.ft.com/3418739774001/Noble-on-China-s-commodities-appetite/Markets

ALVA, Mike, 2012. “China Projected To Be On Par With U.S. As A Future Tech” *KPMG* [online]. 27 June 2012. [Accessed 11 January 2014]. Available from: http://www.kpmg.com/us/en/issuesandinsights/articlespublications/press-releases/pages/china-projected-to-be-on-par-with-us-as-tech-innovation-leader.aspx

BARBOZA, David, 2008. “China Unveils Sweeping Plan for Economy.” *The New York Times* [online]. 10 November 2008. [Accessed 22 February 2014]. Available from: http://www.nytimes.com/2008/11/10/world/asia/10china.html

BEAVER, G.& PRINCE, G. (2002). Innovation, entrepreneurship and competitive advantage in the entrepreneurial venture. *Journal of Small Business and Enterprise Development.* Vol. 9, No 1, pp. 28-37.

BREM, A. (2011). Linking innovation and entrepreneurship – literature overview and introduction of a process-oriented framework. *Int. J. Entrepreneurship and Innovation Management.* Vol 14, No 1

CHU, Kathy, 2013. “China Manufacturers Survive by Moving to Asian Neighbors”. *Wall Street Journal* [online]. 1 May 2013. [Accessed 7 May 2014]. Available from: http://online.wsj.com/news/articles/SB10001424127887323798104578453073103566416

DELOITTE, 2014 “Technology Fast 500 APAC 2013 Winners and results”. *Deloitte* [online], No date [Accessed 8 May 2014]. Available from: http://www2.deloitte.com/global/en/pages/technology-media-and-telecommunications/articles/Technology-Fast-500-APAC-2013-Winners.html

DRUCKER, P. (2002). The discipline of innovation.*Harvard Business Review*. pp. 95-102

EUROPEAN PATENT OFFICE, 2011”FAQ - China.” [online]. 22December 2011 [Accessed 9 May 2014]. Available from: https://www.epo.org/searching/asian/china/faq.html#faq-476%20NYT%20about%20586%20billion%20plan%20:

FRANKELIUS, P. (2009). Questioning two myths in innovation literature. *Journal of High Technology Management Research*. Vol. 20, No. 1

GOVINDARAJAN, V., & TRIMBLE, C. (2012). Reverse innovation: create far from home, win everywhere. *Harvard Business Review Press.*

HAGEDOORN, J. (1995). Innovation and Entrepreneurship: Schumpeter Revisited. *Oxford University Press.*

HAOUR, G. (2007) The shifting Geography of Innovation. *Resolving the Innovation Paradox.*

HAOUR, G. (2010) Defining an innovative firm .

HONG, Kaylene, 2014. “China’s Xiaomi Sells 18.7 Million Smartphones In 2013”. *The Next Web* [online]. 2 January 2014 [Accessed 11 April 2014]. Available from: http://thenextweb.com/asia/2014/01/02/chinas-xiaomi-sells-18-7-million-smartphones-in-2013-up-160-from-a-year-earlier/

How China Fooled the World [TV Show] BBC: This World [Online]. 21 February [Accessed 20 March 2014]. Available at: https://www.youtube.com/watch?v=HUSjMnmS5lI

HUANG, Yasheng, 2012. “China needs to move to an economic model in which innovations, technology, productivity improvements become more important and that will require reforms.” *MIT Technology Review* [online]. 14 November 2012. [Accessed 9 May 2014]. Available from: http://www.technologyreview.com/view/507431/chinas-innovation-success-depends-on-political-changes/

HUI ,Lu, 2012. “Innovation key to growth model shift in China's economy”. *Xinhuanet* [online]. 3 December 2012. [Accessed 5 March 2014] Available from: http://news.xinhuanet.com/english/china/2012-12/03/c_132015631.htm

JENNINGS, Ralph, 2014. “Xiaomi: China’s Best-Selling Answer to the iPhone”. *The Street* [online]. 7 April 2014 [Accessed 7 April 2014]. Available from: http://www.thestreet.com/story/12629020/1/chinas-answer-to-the-iphone.html

JOHNSON & al. (2008). *Exploring Corporate Strategy.* (8th Edition) pp. 320- 322

KRIZ, A. (2010). The challenge to rekindle China's innovative spirit. *Management Decision*, Vol. 48 Iss: 4, pp.541 – 561

KLEINKNECHT, A., VAN MONTFORT, K & BROUWER, E. (2002). The Non-Trivial Choice between Innovation Indicators. *Economics of Innovation and New Technology*, Vol. 11, No 2, pp 109-121

KOSNER, Anthony, 2014. “The Sleek, Large-Screen iPhone 6 Emerges As The Leaks Suddenly Get Physical”. *Forbes* [online]. 24 April 2014]., [Accessed 24 April 2014]. Available from: http://www.forbes.com/sites/anthonykosner/2014/04/24/the-sleek-large-screen-iphone-6-emerges-as-the-leaks-suddenly-get-physical/

MCCORMICK, Rich, 2013. “Xiaomi is shaking up the Chinese smartphone market with quality, and rabbits”. *The Verge* [online], 9 October 2013 [Accessed 22 March 2014]. Available from: http://www.theverge.com/2013/10/9/4819346/xiaomi-profiled-wall-street-journal

MILLWARD, Steven, 2013. “5 of China’s coolest homegrown smartphones in 2013”. *Tech in Asia* [online]. 11 September 2013. [Accessed 18 December 2013]. Available from: http://www.techinasia.com/china-cool-homegrown-smartphones-2013-infographic/

MILLWARD, Steven, 2014. “351 million new smartphones shipped in China in 2013: IDC.” *Tech in Asia* [online]. 24 February 2014. [Accessed 24 February 2014]. Available from: http://www.techinasia.com/idc-says-351-million-smartphone-shipments-china-2013/

MOZUR, Paul, 2013. *How Upstart Xiaomi Rattled China’s Smartphone Race.” *Wall Street Journal* [online]. 8 October 2013. [Accessed 26 November 2014]. Available from: http://online.wsj.com/news/articles/SB10001424052702304441404579120901140934562?mg=reno64-wsj&url=http%3A%2F%2Fonline.wsj.com%2Farticle%2FSB10001424052702304441404579120901140934562.html

NEEDHAM, J. (1982). *Science in Traditional China.* Harvard University

NG, Jasmine, 2014. “Hong Kong Stocks Rise as China Central Bank Pumps in Cash”. *Bloomberg* [online]. 21 January 2014. [Accessed 22 January 2014]. Available from: http://www.bloomberg.com/news/2014-01-21/hong-kong-stocks-advance-as-china-s-central-bank-pumps-in-cash.html

PEI, Minxin, 2011. “China’s Ticking Debt Bomb”. *The Diplomat* [online]. 5 July 2011 [Accessed 16 March 2014]. Available from: http://thediplomat.com/2011/07/chinas-ticking-debt-bomb/2/

Phablet. *Oxford Dictionaries* [Online] No date. [Accessed 11 May 2014]. Available from: http://www.oxforddictionaries.com/definition/english/phablet

PHNEAH, Ellyne, 2012. “Rise in Chinese-funded acquisitions could trigger more hurdles.” *ZDNet* [online]. 22 May 2012 .[Accessed 11 April 2014]. Available from: http://www.zdnet.com/rise-in-chinese-funded-acquisitions-could-trigger-more-hurdles-2062304862/

PHNEAH, Ellyne, 2012. “China takeover as tech innovation center inevitable.” *ZDNet* [online]. 23 July 2012[Accessed 11 April 2014]. Available from: http://www.zdnet.com/china-takeover-as-tech-innovation-center-inevitable-7000001374/

PI, Xiaoqing, 2014. ”China Wages Seen Jumping in 2014 Amid Shift to Services”. *Bloomberg* [online]. 6 January 2014. [Accessed 6 January 2014]. Available from: http://www.bloomberg.com/news/2014-01-06/china-wages-seen-jumping-in-2014-amid-shift-to-services-.html

PORTER, M.E. and STERN, S. (2001) Innovation: location matters. *MIT Sloan Management Review*, Vol 42, No 4. pp 28-36

QING, Koh Gui and XIAOYI, Shao, 2014. “China takes first step to steady economic growth.” *Reuters* [online]. 2 April 2014 .[Accessed 2 April 2014]. Available from: http://www.reuters.com/article/2014/04/02/us-china-economy-tax-idUSBREA3114L20140402

SALGE, T.O. & VERA, A. 2012, Benefiting from Public Sector Innovation: The Moderating Role of Customer and Learning Orientation. *Public Administration Review*, Vol. 72, Issue 4, pp. 550-560

SCHUMPETER, J.A. (1934). *The theory of Economic Development,* Harvard University Press

SCHUMPETER, J.A. (1939). *Business cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process,* McGraw-Hill

SCHUMPETER, J. A. (1943). *Capitalism, Socialism, and Democracy* pp. 81–84

CENTER FOR WORLD-CLASS UNIVERSITIES OF SHANGHAI JIAO TONG UNIVERSITY, 2013. "Academic Ranking of World Universities 2013" Shanghairanking [Online]. No date [Accessed 18 December 2014]. Available from: http://www.shanghairanking.com/ARWU2013.html

SUNNEBO, Dominic, 2014. "Apple regains momentum as Windows stutters." *Kantar Worldpanel ComTech* [Online]. 28 April 2014. [Accessed 6 May 2014]. Available from: http://www.kantarworldpanel.com/global/News/Apple-regains-momentum-as-Windows-stutters

THOMPSON, William; HICKEY, Joseph (2005). *Society in Focus*. Pearson.

WEBER, W. W. (2005) *Innovation durch Injunktion*

WEST, Julia, 2011. "Continued Increases in Globalization and Global Trade - The Chinese Case" *Global financial data* [Online]. No date. [Accessed 28 December 2014]. Available from: https://www.globalfinancialdata.com/news/Articles/ChinaTrade.pdf

Westernization. *Wikipedia, the free encyclopedia* [online]. Last modification of the page the 8th of May 2014 [Accessed 13 May 2014]. Available from: http://en.wikipedia.org/wiki/Westernization

WONG, P. K., HO, Y. P. & AUTIO, E. (2005) Entrepreneurship, Innovation and Economic Growth: Evidence from GEM data. *Small Business Economics* Vol.24, pp. 335-350

WORLD TRADE ORGANIZATION, 2014." China". *Wolrd Trade Organization* [online]. March 2014. [Accessed 28 April 2014] Available from: http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Country=CN&

XUEQUAN, Mu, 2013. "China's political advisors discuss reform, innovation". *Xinhuanet* [online]. 5 December 2012. [Accessed 24 March 2014] Available from: http://news.xinhuanet.com/english/china/2013-12/05/c_125814919.htm

YEE, Lee Chyen, 2013. "China's smartphone shipments to exceed 450 million in 2014: IDC." *Reuters* [online]. 24 September 2013 .[Accessed 18 January 2014]. Available from: http://uk.reuters.com/article/2013/09/24/us-china-smartphones-idUKBRE98N08V20130924

ZHANG, Karen, 2014 "IDC: 2014 Technology Outlook for China's Growing Mobile Phone Industry" *www.idc.com* [online]. 19 February 2014. [Accessed 25 March 2014]. Available from: http://www.idc.com/getdoc.jsp?containerId=prCN24688114

Appendix 1: Data from the Smartphone Market Analysis and the Innovation Indicators

China Smartphone Exported vlue in US Dollar Thousand

2009	2010	2011	2012	2013
39794419	47061928	63194016	81453710	95642031

China Research and Development Expenditure as a Percentage of the GDP

2004	2005	2006	2007	2008	2009	2010	2011
1.23	1.32	1.39	1.4	1.47	1.7	1.76	1.84

Number of Patents Application by Chinese Residents in China

2005	2006	2007	2008	2009	2010
3857.155	5244.32	6519.194	6897.157	10535.081	13615.915